

Michigan Department
of Community Health



Jennifer M. Granholm, Governor
Janet Olszewski, Director

LabLink

Michigan Department of Community Health
Bureau of Laboratories

"Quality Laboratory Science for Healthier People and Communities"

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Michigan Department of Community Health Bureau of Laboratories Changes to West Nile Virus Testing

Patty Clark, M.P.H.

Viral Serology/Viral Isolation/Viral Molecular Unit

Since West Nile virus (WNV) was first detected in 2001 in Michigan, it has become endemic with cases occurring every year during a predictable season. Wider availability of testing for WNV, evolving arbovirus surveillance strategies and resource limitations have prompted the Michigan Department of Community Health (MDCH) Bureau of Laboratories (BOL) to revise the WNV test menu and availability. In 2007, arbovirus testing resources will be directed toward detecting the most severe cases of neuro-invasive disease. Routine serum IgG testing of non-hospitalized patients with suspect WNV will not be available.

Cerebral spinal fluid (CSF) samples will be tested for IgM antibodies to the four arboviruses most likely to be found in Michigan: WNV, St. Louis encephalitis virus (SLE), Eastern Equine encephalitis virus (EEE), and California Group virus (CGV) which includes LaCrosse virus. CSF IgM testing will be performed twice per week. Confirmatory Plaque Reduction Neutralization Test (PRNT) will also be performed on IgM positive CSF specimens to distinguish between flavivirus with cross-reacting antigens. Testing frequency may be adjusted depending on the availability of reagents and controls provided solely by the Centers for Disease Control and Prevention (CDC).

Since many commercial and clinical reference laboratories now offer serum IgM and IgG WNV and other arbovirus testing with acceptable performance, limited public health resources must be directed to other public health priority testing. Therefore, IgG and IgM testing of serum specimens from non-hospitalized patients will not be available at MDCH. Serum testing for PRNT for hospitalized patients will be available only with prior approval of an MDCH epidemiologist. To request serum PRNT, phone the MDCH Bureau of Epidemiology at 517-335-8165.

The BOL appreciates the collaboration with its clinical colleagues that allowed public health to respond to WNV as it emerged as a threat in Michigan. Robust reporting by clinical laboratories has provided essential surveillance data to the Bureau of Epidemiology and CDC. The elimination of arbovirus IgG testing at MDCH will mean a greater dependence upon reporting of positive serum antibody tests by clinical laboratories and physicians. More than ever, assistance in reporting positive test results is needed for arboviral surveillance. Please continue to report all positive arbovirus IgG and IgM results to your local health jurisdiction.

For questions regarding testing, please contact Dr. Anthony Muyombwe at 517-335-8099 or MuyombweA@Michigan.gov.

In Memory of William Sottile, Ph.D., dipl. (ABMM) 1942-2007

Frances Pouch Downes, Dr.P.H., Director, Bureau of Laboratories

Dr. William Sottile died on July 14, 2007 due to complications of lung transplant necessitated by pulmonary fibrosis. He is survived by his wife, Margaret, and children Caroline and Richard.

Dr. Sottile led the Regional Laboratory Section during his 18 year tenure with the Bureau of Laboratories. This section performs bacteriological and chemical analysis of water, STD testing, pulsed field gel electrophoresis of *Staphylococcus aureus*, and is a confirmatory laboratory in the Michigan public health laboratory preparedness network. The Houghton Laboratory relocated to a new facility in 2004 in the Advanced Technical Development Center of Michigan Technological University (MTU).

In addition to his responsibilities in the laboratory, Dr. Sottile directed the testing performed by 23 northern Michigan local public health agencies. He coordinated the statewide system for local public health testing, the Michigan Regional Laboratory System. During his time in Houghton, he held an adjunct appointment at Michigan Technological University where he taught medical microbiology to Medical Technology students and mentored undergraduate special projects in the laboratory.

Following a post-doctoral fellowship at Mount Sinai Medical Center in Milwaukee where he investigated antimicrobial susceptibility testing for anaerobic bacteria, Dr. Sottile served for 11 years as director of clinical microbiology at Chicago College of Osteopathic Medicine.

Born in Miami, Florida, Dr. Sottile served in the U.S. Army prior to pursuing his post-secondary studies. He earned a bachelor in science degree from Florida State University and

Doctorate degree from University of Georgia. His doctoral research in microbial ecology of oceanic, coral reef and estuarine salt marsh ecosystems resulted in the recognition of the role of sediments in carbon cycles.

Dr. Sottile was an active member of the Michigan Society for Infection Control and Prevention, serving on the governing board and as membership director. He was also a member of American Society for Microbiology for over 30 years and was a Diplomate of the American Board of Medical Microbiology. He was active in other professional organizations including the Illinois Society for Microbiology and the American Public Health Association.

Bill was not only a sought out as a teacher, coach and mentor, he pursued scientific knowledge and held a deep appreciation of the environment. He enjoyed fishing, boating and gardening but his passions were his family and his community of worship. Bill was a gentle man and he will be missed by his friends, colleagues and family.



Postal Fee Increase

Samuel Davis, BS, RM(NRM)
Quality Assurance Section

The United States Postal Service (USPS) first class postal fee increase went into effect 5/15/07. The USPS also made changes to the way postal rates for packages are calculated. Fees are now based on weight and package dimensions. Packages that are outside of USPS standard sizes now require additional postage.

Some packaging provided by MDCH Bureau of Laboratories for shipping specimens, such as serology shipping units, as well as units to ship viral culture, pertussis, potential rabies, and CT/GC probes, fall outside of the USPS standards. These packages require additional postage when mailing specimens to the Regional and State Laboratories. For example, a package that previously required postage of \$.75 may now cost \$1.47. Contact your local post office for specific postage rates (or go to www.usps.gov) and to update postage meters.

Delivery of packages with inadequate postage will be delayed.

Specimen packages have been received at the MDCH laboratories with postage due. Public health laboratories have no budget allocated for paying these fees. **MDCH will accept these packages until September 1, 2007.**

It is imperative that you take action to address this situation if you have not done so already. To avoid delay in processing of essential specimens, please ensure that appropriate postage is affixed to your package before placing it in the mail.

Please share this information to other providers in your community who submit specimens to MDCH and regional laboratories through the USPS. We appreciate your prompt attention and assistance and regret the inconvenience this may cause.

Please contact Sam Davis at 517-335-8074 or Daviss@michigan.gov for further information.

MDCH Bureau of Laboratories Customer Satisfaction Survey

Michigan Department of Community Health Bureau of Laboratories is committed to excellence and is continuing the process for future planning into 2008. As part of this process, we are once again seeking feedback from those we serve. Please help by completing a short survey available at <http://www.questionpro.com/akira/TakeSurvey?id=723469>, which should take about five minutes of your time.

This survey will be available until September 30, 2007 and results will be published in the next issue of *LabLink*.

Thank you for helping us to serve you better!

MDCH Author in Publication

The manager of the MDCH Houghton Laboratory, Jeffery P. Massey, Dr.P.H. is a co-author on the article, "Sensitivity and Specificity of Monoclonal and Polyclonal Immunohistochemical Staining for West Nile Virus in Various Organs from American Crows (*Corvus brachyrhynchos*)" which was accepted as an open access article on the BioMed Central, Infectious Diseases website. The complete article can be found by visiting: <http://www.biomedcentral.com/1471-2334/7/49>

Bureau of Laboratories Vision

The Bureau of Laboratories is a stronger, more diverse team within an integrated public health system. We utilize advanced technology and innovative leadership to provide comprehensive public health services in our dynamic global community.

Bureau of Laboratories Mission

We are dedicated to continuing leadership in providing quality laboratory science for healthier people and communities through partnerships, communication and technical innovation.

Bisphenol A: Should We Be Measuring It?

Paul R. Loconto, Ph.D.
Analytical Chemistry Section

"In industrialized countries, nearly everyone is exposed to bisphenol A (BPA), a weak synthetic estrogen. Most of the 2 billion to 3 billion lb produced in the U.S. each year is used to make polycarbonate food containers, baby bottles, refillable water containers, compact discs, and resins that line metal food and beverage cans. The CDC has found measurable levels – 0.4 to 0.8 parts-per-billion of BPA in 95% of U.S. urine samples....Because BPA causes adverse effects in rodents that are almost identical to some of the health problems that have recently increased in human populations, many researchers believe BPA may be partially responsible. The incidence of human prostate cancer rose 85% from 1975 to 2002, and insulin resistance, which leads to type 2 diabetes, became a much more prevalent health problem. The incidence of childhood obesity has more than quadrupled over the past 40 years." [1]

BPA has been reported to bind estrogen receptors and play estrogenic or anti-estrogenic roles in vitro. Additional links to public health include uterotrophic effects, decreased sperm production, stimulation of prolactin release, promotion of cell proliferation in a breast-cancer cell line, and influence on preimplantation development from animal experiments [2]. Yoshihara and co-workers in Japan report on the discovery of a more potent estrogenic metabolite, 4-methyl-2, 4-bis (p-hydroxyphenyl) pent-1-ene, formed by incubation of BPA with rat liver S9 [2].

Analytical chemistry strategies for isolating and recovering BPA from clinical specimens fall into one of three categories:

- Conversion of BPA to a strong electron capture chemical derivative to determine BPA via gas chromatography-mass spectrometry. BPA is isolated and recovered from serum or urine via liquid-liquid extraction with cleanup (LLE/Cleanup) or reversed-phase solid-phase extraction with cleanup (RP-SPE/Cleanup) or ion-pair reversed-phase solid-phase extraction with cleanup
- Determination of BPA via reversed-phase high performance liquid chromatography (HPLC) with fluorescence detection with and without first chemically derivatizing BPA following LLE/Cleanup or RP-SPE/Cleanup
- Determination of BPA without chemical derivatization using HPLC interfaced to a tandem

mass spectrometer (LC-MS/MS) following LLE/Cleanup or RP-SPE/Cleanup

Work on implementing the first analytical approach has begun in the MDCH analytical chemistry section. BPA is converted to an ion-pair with tetrabutylammonium ion. LLE of the ion-pair with subsequent chemical derivatization to form a bis (pentafluorobenzyl ether) of BPA has been demonstrated and found to be consistent with previously published work [3-5]. Two analytical instruments are used to confirm the identity of the derivative. Capillary gas chromatography with atomic emission detection (C-GC-AED) provides a qualitative identification based on the fluorine 690nm atomic emission line. Capillary gas chromatography with electron capture negative ion mass selective detection (C-GC-MSD-ECNI-SIM) provides separation and qualitative identification based on the mass to charge fragment ion at m/z 407 daltons.

References:

1. Hileman, B. *Chemical and Engineering News*, April 16, 2007, p.38.
2. Tsutsumi, O. *Journal of Steroid Biochemistry and Molecular Biology*, 98, 325-330 (2005)
3. Yoshihara, S. et al. *Toxicological Sciences*, 78, 50-59 (2004)
4. Yoshimura, Y., et al. *Analytica Chimica Acta*, 458, 331-336 (2002)
5. Tsukioka, T. et al. *Analytical Sciences*, 19, 151-153 (2003)
6. Brock, J. et al. *Journal of Exposure Analysis and Environmental Epidemiology*, 11, 323-328 (2001)

NOTE:

Four toxicology studies published recently bolstered adverse health effects of Bisphenol A exposure in rodents with links to humans. [Hileman, B. *Chemical and Engineering News*, 85(32), August 6, 2007, p.7]. A second public meeting of a government-appointed panel to examine the risks of exposure to Bisphenol A was held August 6-8 in Alexandria, VA [Chemical and Engineering News, 85(32), August 6, 2007, p.29].

LabLink is published quarterly by the Michigan Department of Community Health, Bureau of Laboratories, to provide laboratory information to Michigan health professionals and the public health community.

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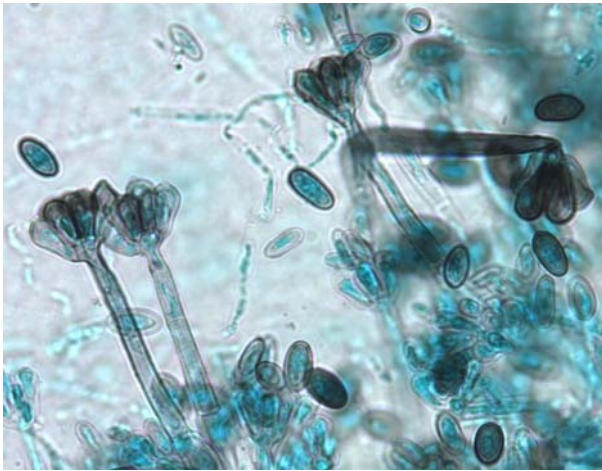
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FUN FUNGI.....

***Stachybotrys* spp.**

Sandy Arduin MT(ASCP) & Bruce Palma MT(ASCP) - Mycobacteriology/Mycology Unit

Last Issues Picture Quiz Answer:



***Stachybotrys* spp.**

Stachybotrys species can be found worldwide. This mould has been isolated from organic material such as soil, hay and straw. It has also been isolated from building materials with a high cellulose content, such as drywall, fiberboard, wood and wallpaper when these materials have gotten wet due to flood damage or other water incursions. Other water incursions include plumbing leaks, shower spills, and excessive indoor humidity resulting in water condensation.

Stachybotrys is comprised of approximately 15 species, most notably *S. chartarum* (formerly known as *S. atra*). *Stachybotrys* produces potent mycotoxins including macrocyclic trichothecenes, which is a potent inhibitor of protein synthesis and potent immunosuppressive agents, phenylspirodrimanones.

Stachybotrys has made headline news both on television and in the newspapers. Examples are "48 HOURS MYSTERY: Silent Killers: Toxic Mold, *Stachybotrys* Can Infest a House," which aired on CBS, July 26, 2002 and "Fungus in 'Sick' Building," published in the New York Times, May 5, 1996. The media has tried to link *Stachybotrys* mycotoxins with deaths due to acute idiopathic pulmonary hemorrhage after exposure to the mould including the case of more than 37 infants in Cleveland, Ohio in 1994. This made headline news on ABC's Primetime Live "Air of Mystery," airing on April 9, 1997. According to the CDC, this association has not been proven. Additional studies of *Stachybotrys*

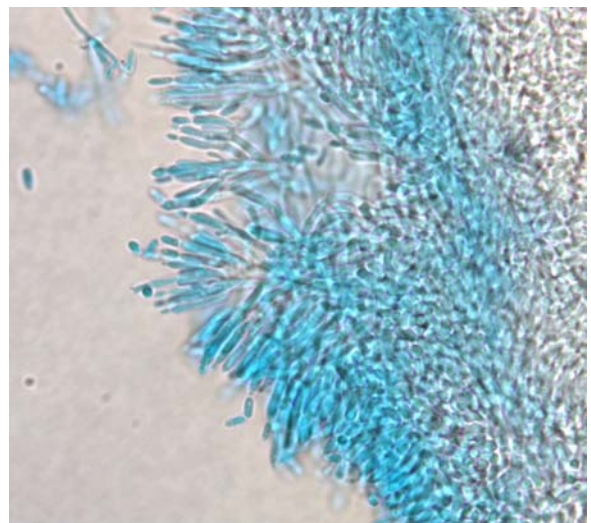
chartarum mycotoxins, as well as other moulds, and their affect on humans are needed.

Stachybotrys spp. initially produces white colonies that become black or greenish-black and powdery with age. Colony growth is moderately rapid. Microscopically, conidiophores are hyaline but may become pigmented with age. Conidiophores may be simple or branched with smooth or rough walls. Conidiophores bear hyaline to pigmented phialides in groups of three to ten at the apices. These phialides can be ellipsoidal to cylindrical in shape. Ellipsoidal, unicellular, smooth to rough walled, brown to black conidia are formed in slimy masses at the tips of the phialides. The unique formation of these conidia and phialides, along with the colony color make *Stachybotrys* easily identified in the laboratory.

References:

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2. St-Germain, Guy, Summerbell, Richard. 1996. *Identifying Filamentous Fungi, A Clinical Laboratory Handbook*. Star Publishing Co. Belmont, CA.
3. www.apsnet.org *Stachybotrys chartarum*: The Toxic Indoor Mold.
4. www.cdc.gov/mold/stachy.htm
5. www.doctorfungus.org *Stachybotrys* species.
6. www.mold-help.org *Stachybotrys chartarum*

This Issues Picture Quiz: What Mould is this?



MDCH Staff Visit, Exchange Knowledge in Mozambique

Jackie Miller
News Briefs Editor,
Communications, Training & Performance
Support

(Reprinted with permission from
MDCH News Briefs, July 18, 2007)

This spring, Dr. Frances Pouch-Downes, Bureau of Laboratories Director and Patty Clark, Manager, Viral Serology/Viral Isolation/Viral Molecular Unit, visited Mozambique.

They went on behalf of a Twinning Project s. Sponsored by the World Health Organization (WHO). The intent is to pair (or twin) labs from resource-rich areas with those who are resource-poor to transfer technology, expertise, and provide consultation.

The trip was funded by the WHO; it is a three-year project at minimum and this is the first year. Staff from Mozambique will also be visiting MDCH. One person has already come to Michigan and another person will visit beginning on July 23rd.

I asked what a workday was like for them in Mozambique.



Maputo, the capitol city (above)

"We were there for one week. In the morning, we had breakfast in the hotel and then were picked up by the person who was our primary contact, Dr. Ilesh Jani. We had visits with different health

programs within the Ministry of Health or non-government organizations. For example, we met with CDC office staff in Maputo, staff from the World Health Organization, different parts of the Institute of Health, and the Clinical Lab Director. At these meetings, the team explained the Twinning Project expectations and outcomes, and both sides shared priorities we'd like to see pursued," Dr. Downes said. .

"They have four different levels of labs in the country and we visited the lab we were twinned with, one of the largest ones, and also visited the a rural health clinic, which was the smallest center organization-wise in the country. We learned about the tests they provide, the training their personnel have, issues about inventory, access to supplies and repairs. We were trying to identify gaps or issues that might arise during the three-year project. If we can identify them ahead of time, we can look for solutions before we run into a roadblock," said Clark.

Dr. Downes has worked in Botswana on a similar project sponsored by CDC. "I went there four or five times. I also worked on a Twinning Project in Jamaica, and have also worked and lived overseas for five years." Patty said, "I have been to Botswana twice, working on similar projects with their Ministry of Health, on HIV testing and surveillance issues."

The pair felt participating in trips and work like this impacts their work at MDCH by "...bringing perspective, in terms of the challenges that other places face and yet, they still accomplish a lot of very good work. It helps us to not focus so much on what we don't have but rather, that a lot can be done and with a lot less," said Dr. Downes. Patty stated, "They also see diseases that are very infrequent or don't exist at all here, for example, someone can be a consultant to us on malaria. It's not just one-way, the exchange goes both ways. They have different health problems than we do. With all the traveling that goes on now, there are diseases being imported that physicians don't see here. This gives us another means to help us in those cases."

It took them 36 hours to travel to Mozambique. One of the four flights is 17 hours long, and there are four flights in all for a total of 24 hours in flight

and , so there is waiting time and layovers between flights.

I asked them to tell News Briefs readers what the country and its people are like.

“We were only there for a week,” said Dr. Downes, “and we didn’t leave the capitol city. It’s on the Indian Ocean, so they are on an enormous beach. The temperatures there were tropical; inland is more desert-like. The country is just coming out of a 30-year civil war. There has been lots of upheaval in population, and people have become refugees in the parts of country where there was fighting. Education was disrupted and the young are just coming of age in the workforce. Most staff working in the labs were probably not even thirty.”

Patty added, “It is quite a poor country. The economy is growing but they have a ways to go. Because they don’t have a lot of natural resources, for example, they don’t have diamonds or beef as they do in Botswana. So, they don’t have the the resources to finance education and health care. Their infrastructure is struggling. Their life expectancy is under 40. Health issues are tropical diseases, malaria, cholera, dysentery, and intestinal parasites.”



Rural health clinic in Mozambique (above)

One of the main issues we’re working on with them is HIV/AIDS.” Dr. Downes said, “It is a significant problem, although not the highest of anyplace I have worked, it is much bigger than anything we’d encounter in the US.”



Health Team in Mozambique

Dr. Downes added, “The workers we met were extremely competent and well trained. Coming from here and knowing what problems and challenges face the country, you would never know that from meeting the people.”

“Someone will be going back to Mozambique, given that this is a three-year project. It depends on skill set needed at the time,” said Patty. They closed by saying that they did a lot of planning and discussion. “The Los Angeles County Health Department laboratory is also part of this team. We can access their personnel team to help with for training and consultation. If LA has the expertise needed for measles culture that Mozambique has identified as a need they need expertise in, for example, a technical person from LA or Michigan would provide the in-country training,” Dr. Downes said.

With travel so limited, readers might wonder how this project is relevant. The state was reimbursed for the salary that was not expended. Both women expressed that, “...we also credit the Director’s support and her appreciation that public health doesn’t stop at the state border or the US border. Events and health situations impact other parts of the world. It is a global community, with such huge problems and what we do is a small part. We certainly can’t tackle HIV prevention and treatment, but there is a small testing part that we try to contribute to.”



Bureau of Laboratories Centennial Celebration Continues

Ninah Sasy, MT
Division of Chemistry and Toxicology

On June 21, 2007, the Bureau of Laboratories commemorated its centennial by hosting a reception at the Michigan Historical Museum. The reception included lab demonstrations, scientific posters, and remarks by MDCH Director, Janet Olszewski and Laboratory Director, Dr. Frances Downes. The celebration continued from July 8 to 21, with a display of posters and photos highlighting recent scientific research and historical accomplishments in the Michigan Historical Museum/ Library Rotunda. BOL laboratory scientists were on hand in the rotunda on July 14, to answer questions about the posters and photos being displayed, as well as offer hands on demonstrations. Some demonstrations included extracting your DNA, pipetting, and an overview of bats and ticks.

The BOL would like to thank everyone for attending and the Michigan Historical Museum for allowing the use of the facility. Please visit www.michigan.gov/mdchlab, select Bureau of Laboratories- 100 Year Anniversary to view pictures from past events. While there, feel free to post a blog about your experience at the reception or rotunda event!



Rotunda event-
Pipetting
demonstration



Museum reception-"How clean is clean?" Dr. John Dyke



Museum reception- DNA extraction with Director Olszewski

Upcoming Events

August 15

The Bureau of Laboratories will host a summer camp on August 15, 2007 from 1-4pm. The session titled *Keeping Michigan Healthy* encompasses hands-on activities that will allow students to discover how historical events have impacted the Bureau's goal of keeping Michigan communities healthy. Please register your child for the session by contacting Jo Anne Arasim at (517) 373-1905 or visit www.michigan.gov/mdchlab Bureau of Laboratories- 100 Year Anniversary for a copy of the registration form and brochure.

QUIRKY BUGS...

Anaerobic Bacteria from Human Blood Cultures

Stephen Haskell, BS, SM(ASCP)
Reference Bacteriology Unit

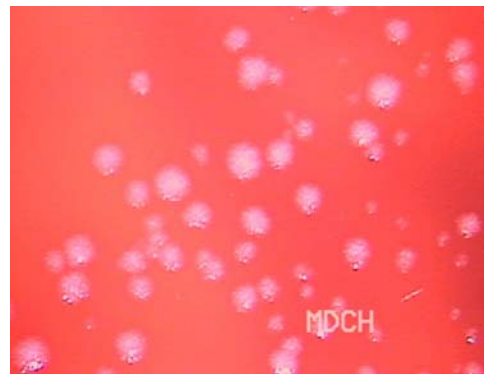
Anaerobic bacteria account for a small percentage of bacteria recovered from human blood infections. Of these, the most frequently encountered organisms are the *Bacteroides fragilis* group and *Clostridium perfringens*. Three anaerobic gram negative rods recently received for identification in the reference bacteriology unit are discussed in this article.

Organism #1 was isolated from the blood of a 78 year-old male with a fever. The hospital laboratory suspected an aerotolerant gram variable rod, possibly a *Clostridium* species or a *Lactobacillus* species. See the photographs below for cellular and colony morphology and Table 1 for biochemical testing results.

Gram Stain (1000x)



Anaerobic blood agar colonies (15x)



Capnocytophaga spp. and *Leptotrichia buccalis* from blood cultures can be linked to patients (primarily adolescents) with hematological malignancies and is a direct clue for the presence of oral mucosal lesions. Often it is confusing to separate these two groups of organisms because their biochemical profiles are similar. However, glucose fermentation end products and cell wall fatty acid composition are helpful.

The cell wall analysis of organism #1 by gas liquid chromatography (GLC) detected large amounts of the fatty acid hexadecanoic acid (C16:0) and no 13-methyltetradecanoic acid (Ci-15:0) consistent with the identification of *Leptotrichia* species. *Leptotrichia sanguinegens* and *L. buccalis* differ in lactose and sucrose fermentation. Both species have been isolated from human blood. *L. sanguinegens* has been isolated from the blood of a pregnant woman, elderly women and neonates. Organism #1 was identified as *Leptotrichia buccalis*.

Organism #2 was isolated from the blood culture of a 51 year-old female with a fever. Growing only in an anaerobic culture bottle, the isolate was submitted to MDCH for identification. A second set of blood cultures collected 24 hours later grew *Escherichia coli*. See the photographs below for morphology and Table 1 for biochemical testing results.

Gram stain (1000x)



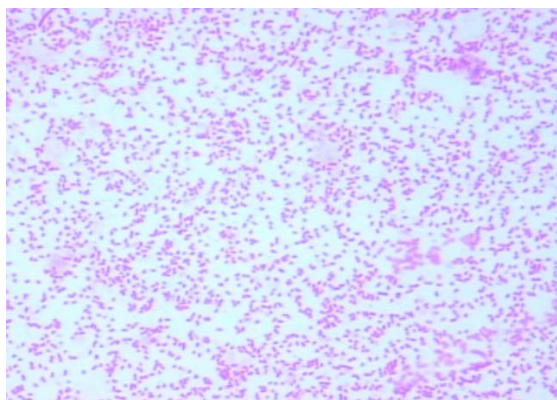
Anaerobic blood plate: 48 hours @ 37°C



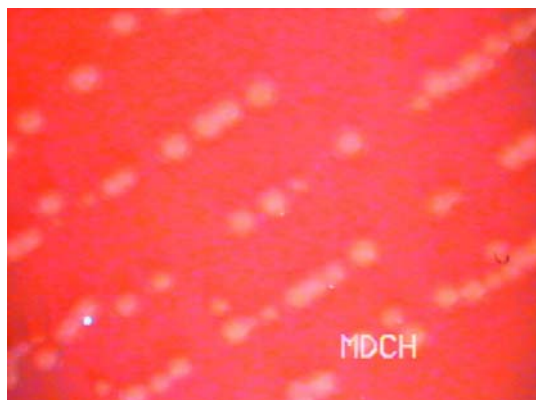
The cell wall analysis of organism #2 by GLC detected large amounts of hexadecanoic acid (C16:0) and cis-11-octadecenoic fatty acid along with small amounts of other straight chain fatty acids. Organism #2 was identified as *Anaerobiospirillum succiniciproducens*. The site of normal carriage for *A. succiniciproducens* is unknown. This organism has been isolated from the blood of patients who are immuno-compromised and from fecal specimens of patients with diarrhea. *Anaerobiospirillum* species are common fecal flora of both cats and dogs. A zoonotic role has been proposed for this infection.

Organism #3 was from the blood of a 54 year-old female with a fever. The submitting hospital observed small gram negative coccobacilli on the Gram stain of the anaerobic bottle but were unable to establish growth on solid media. At MDCH, small gram negative coccobacilli were evident on the direct stain and the initial subculture yielded no growth on solid media. Tryptic Soy broth (TSB) enriched with 10% sucrose was inoculated and incubated anaerobically. There is evidence that increased concentration of sugars may aid in damaged cell wall repair. The subsequent subculture of the TSB sucrose to a Brucella (ANA) agar plate grew tiny yellowish colonies. See the photographs below for morphology and Table 1 for biochemical results.

Gram Stain (1000x)



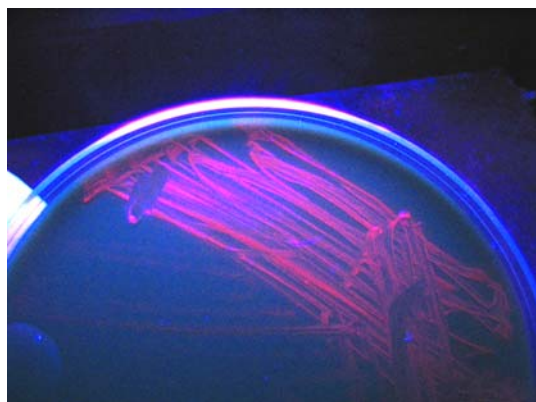
Brucella anaerobic agar colonies (15x)



Anaerobic Blood agar: 48 hours @ 37° C



Red pigment under U.V. light



The cell wall analysis of organism #3 by GLC detected large amounts of hexadecanoic acid (C16:0), cis-11-octadecenoic (C18:1w7c), and Δ-cis11,12-methyleneoctadecanoic (C19:0cyc) fatty acids. Organism #3 was identified as *Porphyromonas asaccharolytica*. Pigmented *P. asaccharolytica* are normal oral and vaginal flora and are among the predominant anaerobic gram negative rods isolated from respiratory tract infections and its complications, including aspiration pneumonia, lung abscess, chronic otitis media, chronic sinusitis, abscesses around the oral cavity, human bites, paronychia, brain abscesses, and osteomyelitis. *P. asaccharolytica* is a common isolate in urogenital and intestinal tract cultures, but can be significant when isolated from other sites.

Table 1

TEST	<i>L. buccalis</i>	<i>A. succiniciproducens</i>	<i>P. asaccharolytica</i>
Anaerobic growth	+ 4 growth	+ 4 growth	+ 4 growth
5% CO ₂ growth	+ 3 growth	No growth	No growth
Aerobic growth	Poor growth	No growth	No growth
Gram stain reaction	Negative	Negative	Negative
Glucose fermentation	+	+	-
Maltose fermentation	+	+	-
Sucrose fermentation	+	+	-
Lactose fermentation	(+)	-	-
Raffinose fermentation	-	-	-
Xylose fermentation	-	-	-
Rhamnose fermentation	-	-	-
Salicin fermentation	-	+	-
Arabinose fermentation	-		
Galactose fermentation		+	
Starch fermentation		-	-
Mannose fermentation			-
α -Fucosidase			+
β -Glucosidase			-
Esculin	Hydrolyzed	Not Hydrolyzed	Not Hydrolyzed
Nitrate	Not reduced	Not reduced	Not reduced
Motility	Negative	Negative	Negative
Gelatin	Not Hydrolyzed	Not Hydrolyzed	Hydrolyzed
Iron Milk	Negative	Negative	Negative
Lecithinase	Negative	NA	NA
ADH	Negative	Negative	Negative
MR/VP	-/-	-/-	-/-
Catalase	Negative	Negative	Negative
Oxidase	Negative	Negative	Negative
Stormy Ferm.	Negative	Negative	
Glucose metabolites	Lactic acid	S,a	A,p,ib,B,IV
Spore stain	Negative	Negative	Negative
Flagella		Polar	
Fluorescence		Negative	Red
Urease		Negative	Negative
Indole			Positive

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